



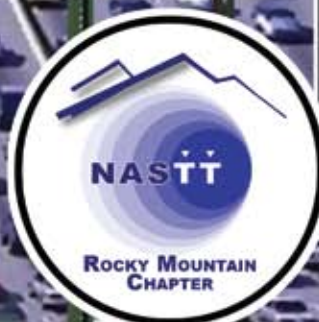
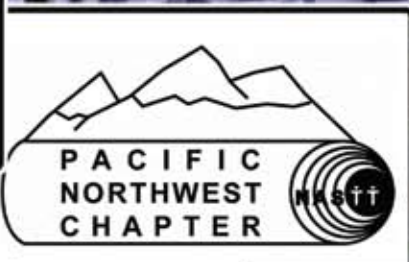
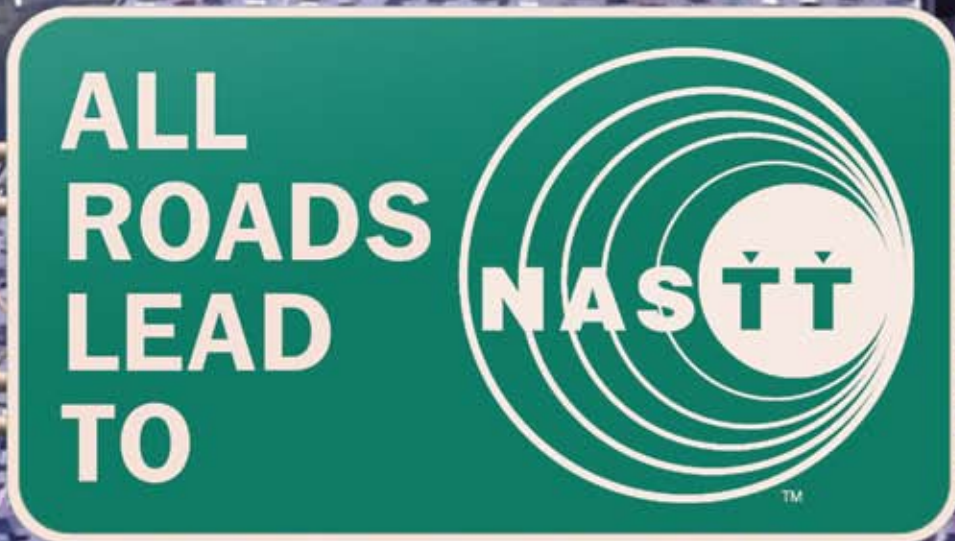
NASTT's *Trenchless Today*

Educate - Train - Research - Publish



FALL 2011

ISSUE No. 3





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**American Augers Rapid Setup procedure
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Message from the Executive Director



Are We There Yet?

As summer draws to a close, no doubt many of us have heard that phrase or it at least harkens past memories. Of course, I'm using it in context of NASTT and the society's mission to preach the trenchless gospel. For 2011, the answer is plainly "not quite yet" but for NASTT and our growing membership, we have had another prolific year. Fortunately, we continue to be resilient despite the bungee cord swings in the economy and world markets that two-step to an unfamiliar tune. The trenchless industry often makes its own way in difficult times relying on optimism rather than survival tips. The many benefits of trenchless solutions for today's infrastructure challenges will always be our strength.

Reporting on leadership news, the final Board of Directors meeting for 2011 was held on July 15 in Nashville, Tenn., at the site of 2012's No-Dig Show. In many ways, it was a milestone meeting as it marked the retirement of five directors: George Cowan, Carp-Seca Corp.

(champion of the Educational Auction and willing hand with student activities); Mark Hallett, SAERTEX multiCom LP (past Treasurer and 2010 No-Dig Show Program Committee Chair); Jim Hoggatt, South Tahoe Public Utility District (recipient of the 2011 Chairman's Award and original NASTT member); Kaleel Rahaim, Interplastic Corp. (Treasurer and 2008 No-Dig Show Program Committee Chair); and Robert Westphal, Michels Corp. (NASTT Vice Chairman). Sadly, Bob Westphal, who was due to become the NASTT Chair in 2012 and continue our proud leadership legacy, is leaving the Board early due to family illness. On behalf of all of NASTT, we wish Bob and his family the very best for the future. The Board of Directors has consequently confirmed George Ragula to continue in the role of NASTT Chair for an additional year. Thank you to George for extending his valued commitment to NASTT.



Chairs past and present at the 2011 No-Dig

Leadership at all levels has always been remarkably superior at NASTT bringing both strength and confidence to the society. Starting in 2012, we are introducing a new way to acknowledge our leaders and champions with the creation of the NASTT Hall of Fame. Honoring individuals who have made significant contributions to NASTT and the trenchless technology industry, the first inductees will be recognized and named to the Hall next March at the 2012 NASTT Gala Awards Dinner in Nashville.

Also on the horizon for next year, five new publications are in the works as companion documents for the NASTT Good Practice Training Courses. Capturing the spirit of our high-quality training in print will expand our educational toolbox and make trenchless information more accessible.

We started this year with the inaugural issue of NASTT's *Trenchless Today*, and as this third issue goes to print, I can announce that the location for the 2013 No-Dig Show will be Sacramento, Calif. More information will be forthcoming in the months to come, but the Board of Directors and NASTT staff are extremely excited about returning to the West Coast in 2013.

Thanks again to the many NASTT members who sent feedback on this publication and offered excellent ideas for future articles or features. Very special thanks to the many loyal sponsors who make the magazine a reality. Remember, this is a publication "about the membership and for the membership," so please feel free to send in your suggestions or even volunteer your time.

So, are we there yet? Not quite, but we're making progress.

Sincerely,
Mike Willmets
Executive Director, NASTT



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Membership Benefits

I remember it as clear as yesterday. While working for a New York City utility in 1987, the resounding words “trenchless technology” appeared in many trade journals. I was immediately intrigued and curious about what it was. I knew a lot about construction, but what exactly was trenchless construction, and what did it mean?

Little did I know I would spend the greater part of the last two decades committed to the ever-growing technologies in trenchless construction. Even far more removed was the eventual role I would play as a proud leader in the society I joined in 1991, working with dedicated professionals who really care about their industry. The early leaders of NASTT that I looked up to would eventually become my mentors — and now my peers.

Two-thirds of my career has been spent in the trenchless construction area, an anomaly for someone in the conservative gas industry. Trenchless has become the central core of my work from both a construction and R&D perspective. The education and exposure I received through NASTT had a direct impact on the benefits my company would reap. It helped me provide an R&D platform to develop trenchless applications, techniques and equipment specific to the gas industry.

HDD, CIPP, CCTV, pipe splitting, internal robotics and internal pipe repair are continuously being embraced by my company (Public Service Electric & Gas) and the entire construction industry as we evolve into the 21st century, and NASTT continues to be a central pillar in helping make this happen. Because of my involvement with NASTT, my company continues to lead the industry in the use of many trenchless technologies that save millions of dollars. All totaled, PSE&G has saved nearly \$10 million over the last 20 years through the use of trenchless construction compared to traditional practices — the fundamentals of which I learned directly from NASTT and its conferences, forums and networking opportunities.

NASTT's Introduction to Trenchless Technology short course is a great educational tool for both newcomers and veterans in this industry. The training course touches on microtunneling, pipe jacking, auger boring, sliplining and lateral lining, among other topics. The educational opportunities the society provides its members are extremely beneficial to today's construction engineers.

The construction industry cannot afford to do business today like we have done in the past. Traditional construction techniques are expensive, disruptive and often harmful to the environment. We have to transform ourselves and look to the future. We should aim for the majority of construction to be trenchless in 20 to 30 years. It's obviously a tall order, but that's where we need to set the bar and have R&D accomplish it with technical input from industry experts and government support.

NASTT will help us reach this mark as it continues to grow and provide technical training, publications and forums. As the society adapts and evolves to meet its mission in a challenging environment, its members continue to benefit from the knowledge and experience gained. NASTT can provide an avenue for its members to develop the trenchless industry into a leading force. So get involved, get engaged and get educated. NASTT has changed my career for the better, and it can do the same for you.



I hope to see you at upcoming meetings, seminars and education sessions!

George Ragula
NASTT Chairman

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Q&A

Brenda Kingsmill, project manager of wastewater services in Ontario's Halton region, comments on how tunneling is still evolving



NASTT's Trenchless Today: Please give us a little information about your professional background.

Kingsmill: I graduated as a forestry technician in 1977 from Sault College of Applied Arts and Technology (in Ontario) and graduated again with a Certificate of Technology with distinction in civil engineering in 2010 from the British Columbia Institute of Technology. I worked for a consulting engineering firm in Alberta from 1978 until 1986 as a draftsman/surveyor. In 1986, I started with Halton Region in Ontario as a draftsman, in 1989 became the design technician and in 1999 became a design supervisor. In 2010, the design supervisor position was re-designated as a project manager. As a project manager, I am now responsible for the environmental assessment, design and construction administration of numerous linear and facility projects.

NTT: How did you choose the wastewater industry?

Kingsmill: Prior to 2009, the design supervisor was responsible for transportation, water and wastewater design projects. In 2009, Halton re-positioned and split the groups into their respective designations. I chose to re-position into the Wastewater Design and Construction Services group.

NTT: What are your areas of expertise?

Kingsmill: I am mainly experienced in linear design and construction including replacement by open cut, installation of new pipes by tunneling or open-cut and rehabilitation of existing systems (both main line and laterals) by trenchless methods.

NTT: What specific projects are you currently working on? How are they unique?

Kingsmill: I am currently working on a watermain and wastewater main replacement project that includes lining of 50 percent of the laterals. I'm also working on the replacement of a 400-mm watermain (due to a proposed railroad grade separation) and the lining of the 525-mm wastewater main, unique in the dewatering of the existing soils, pipe ramming in place of bore and jack, and structural lining of the wastewater main using a UV curing system.

I'm also involved with the design (and ultimately construction) of an effluent gravity sewer from our Mid-Halton wastewater treatment plant in Lake Ontario. This project has a proposed depth of 30 to 50 m, a length of 6.4 km (including 2.1 km under Lake Ontario), tunneling in Georgian Bay Formation shale, crossing of a regulated creek with endangered species habitat, numerous approvals (rail, road, Conservation Authority, Ministry of Natural Resources, etc.), high pressure pipelines, a well-used public park, diffuser system and the building of a picnic shelter on top of our access shaft including venting through the corner of the structure.

I'm working on two business park designs. The Milton Business Park II includes a pumping station, temporary

force main and two overflows. Winston Park West Business Park requires us to tunnel under the Queen Elizabeth Way and highway ramps with small diameter pipe (375 mm). Also, 900- and 975-mm wastewater main with twin 750 mm force main installations will happen on Dundas Street, an extremely busy arterial roadway.

NTT: What is the outlook for the future – near and long term?

Kingsmill: Halton is seeing huge growth in the next 20 years and will be doubling its current population. There is high pressure for growth-related projects including linear pipes, pumping stations, booster stations and plant expansions. The requirement for old infrastructure replacement and rehabilitation is also growing at an alarming rate. Halton has been proactive in the past with rehabilitation of many kilometers of old cast iron water mains and this will help with the financial squeeze that everyone is currently experiencing.

NTT: What new trends are you seeing that are affecting the market?

Kingsmill: I am currently seeing a big push for large diameter tunneling. In Ontario we have limited numbers of contractors who can do the large diameter tunneling. With other municipalities tendering projects, as well as Halton, I anticipate more demand for contractors. This, of course, will have an impact on costs.

NTT: How did you become involved with NASTT?

Kingsmill: Halton was one of the original members, and I was originally a member through my design technician position (at Halton) and have kept up the membership. I was not particularly active until the last few years. When No-Dig came to Toronto in 2009, I volunteered to help out and have been involved ever since. I am now a member of the Program Committee, a session leader and have been a session moderator.

NTT: What are some of your most memorable professional experiences?

Kingsmill: In more than 30 years, there have been many – from trying to survey through snow up to my waist (try to find those property bars or slide down the hill straight at a moose), to being stuck in mud so heavy I couldn't lift my foot. From having residents calling that their basement is backed up with sewage because their lateral was blocked to getting those 2 a.m. calls for a watermain break.

I think my most memorable is completing construction on one of the largest road reconstruction projects that Halton had undertaken at the time. I worked with so many different people, it was my first complete design assignment, we were making that move from manual design to using computers, and of course, the successes and receiving the letters from the residents thanking us for doing such a great job.



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Meet the Prof

Dr. Samuel T. Ariaratnam of Arizona State shares his pride for teaching our future trenchless engineers



NASTT's Trenchless Today: How did you get involved with NASTT and the Arizona State University-NASTT student chapter?

Samuel T. Ariaratnam: Back in 1996, I was an assistant professor at the University of Alberta in Edmonton, Canada. At the time, a group of people with an interest in trenchless technology got me involved in helping establish the Northwest Chapter. In 1997, I attended my first No-Dig Conference in Seattle and also established the University of Alberta NASTT Student Chapter. Shortly afterward, I was elected to the NASTT Board of Directors where I served for six years including a year as secretary. I have brought students to the annual No-Dig Conference for the past 14 years. It is important for these young men and women to gain exposure and meet the many great people who are involved in our industry. Upon moving to Arizona State University in 2001, I started the ASU NASTT Student Chapter, which continues to be active. Many of our chapter alumni currently hold key positions in our industry.



NTT: What is most enjoyable about working with your student chapter?

Ariaratnam: Working with the student chapter is very rewarding for me personally. These students are interested in learning about the many facets of trenchless technology. Fortunately, being in the Phoenix metropolitan area enables me to take my students to visit a wide range of trenchless

jobsites in the area. There is always some type of trenchless project being undertaken. I enjoy taking my students to the annual No-Dig show and seeing them participate in the student activities organized by NASTT. Interaction not only with the industry but also their peers from other student chapters is important for their educational development.

NTT: What types of courses do you teach?

Ariaratnam: I teach a joint senior-level elective and graduate-level course titled "Trenchless Construction Methods." Taught in a single three-hour block for 16 weeks, the students gain exposure to a majority of the trenchless methods. Each semester I bring in representatives from various NASTT member companies to give guest lectures on their technology expertise. This brings excellent practical exposure for the students.

NTT: How have the students changed throughout your years of teaching?

Ariaratnam: Students have changed quite a bit since I first started teaching. Today, we see more non-traditional students. These are students who did not enter college directly from high school but either completed a different degree or worked and decided to go back to school. I also find that more of our students have added responsibilities including family commitments. Consequently, they work part-time in construction/engineering-related fields while going to school. A benefit is that many of the students today have industry experience and have either seen or heard of trenchless technologies.

NTT: Why are students an important part of NASTT?

Ariaratnam: Students are the future of our industry. The young men and women who are part of the various NASTT student chapters gain tremendous exposure to the trenchless industry and become future members of NASTT. Many of my past students are now actively involved in NASTT and the trenchless industry as a whole. The generosity of NASTT in supporting student activities through its educational fund truly provides a win-win situation for our industry.

NTT: What do you see in the near future for young trenchless engineers?

Ariaratnam: Young trenchless engineers have excellent future prospects. As we start to come out of our current financial situation, I foresee more and more government agencies looking at adopting economically feasible and environmentally friendly technologies in addressing the crumbling state of our underground infrastructure system. These are wonderful opportunities for students who have even the most basic level of exposure to trenchless methods. As chairman of the International Society for Trenchless Technology, I also see future opportunities for employment globally, as the worldwide market for trenchless continues to also grow.

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Networking Opportunities

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Members receive discounted pricing on these NASTT publications: *No-Dig Show Conference Proceedings*, *HDD Good Practices Guidelines* and the *NASTT Pipe Bursting Good Practices Guidelines Manuals*. Enjoy complimentary subscriptions to the industry's leading trade magazines, including *NASTT's Trenchless Today*.

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In the Trenches



Three of NASTT's faithful share their stories

By Kelly Pickerel

NASTT's members make the organization what it is. Three of those dedicated trenchless enthusiasts — Ian Doherty, Peter Oram, Dennis Walsh — tell their stories below. None expected their work to lead to the trenchless industry, but all are glad their involvement with NASTT helped lead them to interesting career paths. *NASTT's Trenchless Today* retraces their three paths to find out how far they've come.

Ian Doherty

Ian Doherty might say his most memorable No-Dig moment was when he presented his first paper on watermain sliplining in 1995. Or maybe it was that time in Montreal when he fell into the fountain pool when getting up from a table. Whatever the case, Doherty says his 15-plus years in NASTT have paved the way for him in the trenchless industry.

"My involvement with NASTT has maintained and reinforced long-lasting relationships with others in the trenchless industry, a result highly beneficial to my trenchless rehabilitation engineering business," Doherty says. "My involvement with NASTT has allowed me to obtain much key — and often otherwise difficult to obtain — information about trenchless products and their performance. This information has been most beneficial in making my projects successful and avoiding pitfalls."

Doherty's career path didn't begin with trenchless. While working as an engineer for Canadian plastic pipe producer Maple Leaf Plastics in 1989, Doherty visited Subterra, a utility pipeline rehabilitation manufacturer in the United Kingdom, looking for new products



Doherty

to manufacture. It was in Europe that Doherty saw his first trenchless installation at a watermain lining jobsite. With his new knowledge, he joined start-up trenchless installation contractor Samuel Pipeliners in Toronto in 1991 to introduce the U-Liner form/fold lining product to Eastern Canada.

"The Samuel Pipeliners days were exciting and eye opening — so much opportunity, so little knowledge," he says. "By 1993, I realized that municipalities, trenchless contractors and even product manufacturers needed independent engineering expertise in trenchless technology."

Doherty formed Trenchless Design in 1993, which later became Trenchless Design Engineering Ltd. He says his objective was to focus exclusively on trenchless rehabilitation rather than new construction, but the company has taken on a few new projects in Canada, Mexico and the United States.

Although he is the president and owner of Trenchless Design Engineering, Doherty is still involved with designing projects for municipalities, providing liner designs to installation contractors, assisting contractors through installation difficulties and assisting manufacturers in product development. He has been involved with teaching trenchless courses and presenting papers at various conferences and seminars. One of his biggest accomplishments is the CIPP design software (CIPP-DESIGN) that he authored.

He joined NASTT soon after starting Trenchless Design, and the group has helped him in all aspects of business.

"NASTT was and is the focal organization for all things trenchless in Canada and the United States," he says. "It was and is a key organization in the development of my business."

Peter Oram

Peter Oram became involved with the trenchless business after receiving a crash course in pipe rehabilitation. He was a trainee engineer in 1985 working for a water company in the United Kingdom when he was told he would stand in for the resident inspector while he was on vacation.



Oram

"I was told I would have a week with him to 'learn everything about the project' before starting," Oram says of the water main cement mortar lining program. "I actually had about an hour of training before taking charge."

Since then, Oram has been involved in some way with trenchless, predominantly with pipe rehabilitation. He worked

at the water company for 10 years before moving to a rehabilitation consultant that was eventually acquired by AECOM in 2001. He is currently an associate for AECOM for the water business line in Virginia Beach, Va., where he has been located for two years.

"There is a significant industry interest in the condition of infrastructure and being able to plan for the future," he says. "Choosing the right options for buried pipelines involves consideration of a number of factors and there are some excellent tools available to us."

Oram's involvement with NASTT for the last 10 years, including his time on the No-Dig program committee, has helped him explore ideas that he might not have come up with on his own.

"I believe that NASTT brings together a wide range of people with many interests but a common goal of trying to develop and implement trenchless or no-dig technologies," he says. "The knowledge and camaraderie in the organization made it a perfect place to meet people and extend my knowledge and capabilities particularly when transition between U.K. and U.S. workplaces."

The practical point of view and guidance gained from attending conferences and training courses also help Oram in his career.

"I have some very good friends in NASTT and know that I have access to industry leaders in all relevant areas with extensive experience and capabilities," he says. "Personally, I enjoy the opportunity to consider new technologies and understand the benefits and risks of using them."

Dennis Walsh

Dennis Walsh was present during the beginning stages of NASTT, and although he ducked out for a few years, he's back and enjoying how much the organization has grown.



Walsh

"I joined NASTT the first year it was in existence," he says. "As time went on, I moved to other parts of the natural gas industry so I left NASTT. Then in 2005, I started consulting and helping gas utility clients with trenchless solutions. I immediately rejoined NASTT."

Walsh is currently a senior project manager at Woodard & Curran, an engineering and environmental

firm based in Portland, Maine. His 30-plus-year career has spanned across many areas of the utility engineering and construction business. He has previously worked with Brooklyn Union Gas (which morphed into KeySpan Energy Co. and now National Grid) and other projects in New York City.

"Back in the late 1980s, I led a Brooklyn Union Gas team to look at new ways to reduce our main and service installation costs," he says. "Trenchless became the way we did that. It was a real cultural shift in construction in urban environments we worked in."

He says trenchless is an area where the benefits are quite obvious: fewer disruptions during construction, pavement restoration savings and cost savings. After moving away from trenchless within KeySpan, Walsh retired from the company in 2005 and reconnected with the trenchless industry in his consulting role at Woodard & Curran. In 2009, Walsh's longtime friend George Ragula nominated him for the board of the Mid Atlantic NASTT Chapter, and Walsh is glad to be back.

"People don't realize just what trenchless has done for their lives," he says. "Part of NASTT's mission is to convey that message, and that is what makes it so special — being able to stay ahead of new technology advancements and being part of an organization that betters the quality of life through better construction methods."

Walsh attended the first and second No-Digs and then came back for the 20th. He says it's great to see how big the organization and show have become over the years.

"My favorite No-Dig destination is Washington, D.C., since I attended the first No-Dig and having just attended the 20th," he says. "Just being there again in D.C. was nice."

Kelly Pickerel is assistant editor of NASTT's *Trenchless Today*.



2011 NASTT Membership Directory

The North American Society for Trenchless Technology is pleased to provide you with its 2011 NASTT membership directory. Founded in 1990, NASTT is a not-for-profit educational and technical society dedicated to promoting the benefits of trenchless technology. The directory pages are divided into three categories: individual, corporate and municipal. Individuals are listed with their company affiliation. Primary contacts and secondary members are listed for each corporate and municipal listing.

The membership directory printed in this issue was current as of Sept. 1, 2011. Members should contact Angela Ghosh at agghosh@nastt.org to submit any corrections.

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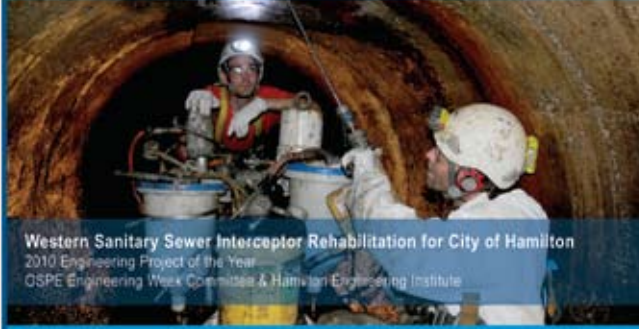
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The Program Committee is responsible for making No-Dig what it is. Not only do members plan events, but they also review abstracts, serve as session moderators, judge contests and help with sub-committees like the auction committee, entertainment committee and the student activities committee. This great group of dedicated people aims to make each No-Dig Show better than the last.



Program Committee Vice Chair
Kimberlie Staheli
The 2012 No-Dig will feature a brand new position: Program Committee vice chair. The vice chair is largely responsible for assisting the chair and learning the ropes in order to take over the following

year. Kim says the vice chair position is important because it ties up previous loose ends and prepares her for 2013.

"Having a day job and being the chair is really like two full-time jobs," she says. "I'll be doing whatever it takes to make the conference go smoothly. There's a lot to learn!"



Benjamin Media Inc. Conference Division

Michelle Hill, Mary Beth Butkovic, Kevin Duresky
Those at Benjamin Media have a busy schedule leading up to the No-Dig Show. Michelle, conference manager, works on budgets, selects room space used at the Gaylord, orders attendee giveaways, books the social event entertainment and plans city tours. She also handles registration before the show.

Kevin, conference sales coordinator, sells booth space and sponsorship. He also works closely with the Gaylord hotel chain and Viper to create a functional floor plan and exhibit hall. Mary Beth is the show's financial manager. She also is involved with determining the year's budget.

At No-Dig, Mary Beth is a valuable member of the auction committee, busy setting things up. Kevin assists with exhibitor move-in, and Michelle manages the on-site staff and attendee database.



NASTT Executive Director and Assistant Executive Director

Mike Willmets and Angela Gosh

Mike is largely responsible for public relations and overall management of the conference while Angela acts as the Program Committee liaison and coordinates different programs. The two have full confidence in the program committee and help with No-Dig when needed.



No-Dig Student Supervisor

Sunil Sinha

Sunil ensures all students who will attend No-Dig have a hotel room and understand their obligations during the show; They must help out at the conference and attend student orientation, poster competitions and the student auction.

Although he says the shows are usually successful, he takes the students' feedback into perspective. "It's the responsibility of us to make sure everything runs smoothly," he says. "It's not fair to give more students more workload while others basically attend for free."



No-Dig Student Events Coordinator

Sandra Gelly

There are many student competitions at No-Dig, and they require many student events coordinators. Sandra has helped with the CCTV Condition Assessment Competition by choosing videos for students to review and, along with other colleagues, supervising the half-hour condition assessment of the videos.

"The competition is made to be fun after all, so we stay open to variations in terminology and descriptions," she says, adding that all competitions at No-Dig allow students to participate in realistic situations — an ideal learning environment for young engineers.



No-Dig Student Assistants

Alison St. Clair, Kristi Steiner

For the past two years, Alison and Kristi have planned all student activities at No-Dig, including student competitions and the student dinner. At the show, they make sure students attend the auction as the money raised goes toward student scholarships and show accommodations.

"It is so great to see students motivated in this field and everything they take away from this conference," says Alison, who planned events in 2010 for Chicago and assisted Kristi for the 2011 show. Kristi is in the process of developing a manual for future student coordinators, listing deadlines and protocol for a successful show.



No-Dig Photographer

Kate Pemberton

Kate from *Trenchless International* magazine has enjoyed being the official photographer for No-Dig. In addition to producing the daily newsletter, the magazine staff produces a photo folder memento for attendees.

"I have a fantastic time, as NASTT is a great bunch of people," she says. More than 1,000 photos are taken and nearly 500 are printed and distributed to NASTT members.



Program Committee Technical Support

Mel Young

Mel organizes and converts technical papers onto CDs for committee members to review, organizes Power Point presentations for No-Dig sessions and resolves any issues during the show.

"The whole process takes place over several months with the last flurry of activity in the weeks and days preceding the conference," he says. "While there are some frustrating times (mostly time constraints), the rewards, friendships, contacts and networking makes it very rewarding."



Education Fund Auction

Master of Ceremonies

Bernie Krzys

Bernie emcees the auction and is also a dedicated member of the Auction Committee, spearheading advancements to the event. He helped organize an eBay online auction for the 2011 No-Dig that helped bring in a record amount of successful bids. An integral part in the initial formation of the auction in 2002, Bernie says he enjoys being the master of ceremonies and helping raise money for a great cause — principally university students who represent the future of the trenchless industry.

NO-DIG BEHIND THE SCENES



NASTT Accountant and Committed Volunteer

Laura and Walter Ranger

Laura is the society's personal accountant and helps each year with No-Dig's budget, but she also is involved with show registration along with her husband, Walter. Both provide their time at the reception assisting with attendee check-in and registration.



Education Fund Auction Committee Chair

Jim Rankin

Jim makes sure all deadlines are met concerning the auction. The largest responsibility he has is making sure donors are solicited for the auction items and that the donated items are received by the start of the No-Dig Show.

"My favorite part about being involved with No-Dig is the fantastic people that work with and are associated with this industry," he says. "Trenchless is green, cost-effective and will continue to grow as the desired method of utility installation."



Education Fund Auction Committee

This year marks the 11th annual auction and reception. All funds raised go toward supporting educational initiatives, like sponsoring student attendance at No-Dig, providing scholarships and training opportunities. Donated items are auctioned in person and online through eBay. This year's auction committee consists of: Jim Rankin (chair), Kevin Nagle (vice chair), Brian Avon, Jack Burnam, Mary Beth Butkovic, Angela Ghosh, John Giese, Mark Gorman, Joanne Hughes, Bernie Krzys, Mo Najafi, Cindy Preuss, George Ragula, Jeanette Rankin, Sunil Sinha, Isabel Tardif and Mike Willmets.



Education Fund Auction Mascot
Mortimer the Sewer Rat

NASTT'S HALL OF FAME

Please join us in Nashville at NASTT's 2012 No-Dig Show to help us honor the trenchless professionals who make up the inaugural hall of fame class of 2012, as we induct them into legend during the famed NASTT Gala Awards Dinner.



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HDD in Jacksonville	Permitting and Environmental Considerations
JEA's Trenchless Program	Pilot Tube Microtunneling
Large Diameter HDD Crossings	Pipe Bursting
Legislative Issues Related to Underground Construction	Pipe Bursting Case History
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SpectraShield Liner Demonstration hosted by SpectraShield
Butt Fusion and Electrofusion Demonstration hosted by The Alliance for PE Pipe
HDD Demonstration hosted by Vermeer
JET UP! Demonstration hosted by Nozzteq, Inc.
Perma-Main™ with the Continuous Lining "Top Gun" Demonstration hosted by Perma-Liner Industries, Inc.

Horizontal Directional Drilling (HDD) Good Practices Guidelines Course:

Horizontal directional drilling (HDD) has become a workhorse that is used every day on utility construction projects. To be most effective in specifying, managing and inspecting utility construction projects, you need to know the ins and outs of HDD. North American Society for Trenchless Technology (NASTT) will be hosting this special HDD course at the Jacksonville *Trenchless Technology* Road Show.

Networking Reception sponsored by The Alliance for PE Pipe

www.trenchlessroadshows.com



NASTT Chapter News

Regional Chapter News

British Columbia

The updated website for NASTT-BC was unveiled during the summer. The chapter also held its “Trenchless Technology Lunch and Learn” session in July covering the reality and best practices of CIPP and ASTM, presented by Metro Testing Laboratories Ltd.



The new NASTT-BC website was released this summer.

NASTT-BC has three upcoming events – Kelowna Seminar on Oct. 20, Victoria Seminar on Dec. 6 and the Lower Mainland Seminar on Dec. 7.

Great Lakes, St. Lawrence & Atlantic

In July, the GLSLA Chapter held its NASTT Pipe Bursting Good Practices Technology Course in Ontario. The chapter is also readying for the Atlantic Canada Water & Wastewater Association (ACWWA) Conference in St. John's, Newfoundland and Labrador, on Oct. 2-4. This year's conference will concentrate on the necessity of water and the devastating effects of natural events. Members will also attend the INFRA 2011 conference in Quebec City on Nov. 7-9.



The ACWWA Conference starts Oct. 2.

Mid Atlantic

The Mid Atlantic Chapter has an upcoming two-day seminar in November in Norfolk, Va.

Midwest

The Midwest Chapter had a trenchless technology seminar Aug. 2-3 in Cincinnati titled “Trenchless Technology, SSES and Buried Asset Management.” Jerry Weimer, wastewater collection system supervisor for the Metropolitan Sewer District of Greater Cincinnati, was the guest presenter, giving a talk on sewer safety. Municipal employees, manufacturers, contractors and engineers were all in attendance for the networking and learning event.

MSTT has an upcoming seminar in September in St. Paul, Minn.

Northwest

The Northwest Chapter will be presenting the 2011 Northwest Trenchless Conference in Calgary, Alberta, on Nov. 16-17

at the Coast Plaza Hotel. The 15th annual presentation will feature a CIPP short course, a symposium and tradeshow.

The chapter has announced the upcoming dates for the Edmonton Technical Lunch Program: Sept. 29, Oct. 26, Jan. 19, Feb. 16, March 29 and April 26. The first lunch on Sept. 29 will feature guest speaker Craig Vandaele, project manager with Michels Canada. The Oct. 26 event will have Mark Van Hoose of Dewind One Pass Trenching presenting.

On Jan. 25, 2012, NASTT-NW will have a new installation methods short course in Winnipeg, Manitoba.

Pacific Northwest

The Pacific Northwest Chapter is currently developing a website the group hopes to debut sometime this fall. The chapter is also in the beginning stages of planning two events: a trenchless luncheon and a symposium.

Rocky Mountain

On Oct. 6-7, the Rocky Mountain Chapter will have its second annual conference at the Doubletree Hotel in Westminster, Colo. The conference will have a CIPP short course, speaker presentations and a vendor exhibit area.

The educational sessions will address topics related to the trenchless industry including recent construction, new design and installation, rehabilitation and repair, condition assessment, asset management for buried infrastructure and tunneling and trenchless methods.



The 2nd annual Rocky Mountain Regional No-Dig show will be Oct. 6-7.

Speakers include Jeff Maier (MWRD), Alan Crouch and Peter Kraft (Denver Water), Bethany McDonald (Pure Technologies), Ron Halderman (Mears Group), Owen Randall (Fort Collins Utilities), Ray Post and Martin Sanders (Michels Construction), Jim Potter (City of Denver), Darlene Garcia (Colorado Springs Utilities), Matt Wasam (SAK Construction), Stuart Bowns (Hydromax USA), Jason Lueke (Arizona State University), Swirvine Nyirenda

(Aurora Capital Projects Division) and Christian Baumgart (Western Summit Constructors). For more information and to register online, visit www.rmnastt.org.

Southeast

SESTT will have a seminar Sept. 28-29 titled "Trenchless Technology, SSES and Buried Asset Management" in Miami. Those interested should contact Leonard Ingram at leonard@engconco.com. The Southeast Chapter also has an upcoming two-day seminar in December in Atlanta.

Western

The Western Chapter will present the 7th annual Western Regional No-Dig Conference & Exhibition on Oct. 3-4 in San Jose, Calif. The WESTT conference provides the benefits of a national conference program but in a smaller forum. Those attending can take part in informative technical programs and explore the product exhibit area.



The Western Regional No-Dig Show will be at the Wyndham in San Jose.

In Memoriam

Paddy Ryan O'Tool

June 29, 1958 – July 16, 2011



NASTT extends our deepest sympathies to the family and friends of Paddy Ryan O'Toole, founder and president of PTR Communications. After a courageous

battle with cancer, Paddy passed away peacefully on July 16 with his family and trusty dog Tessa close by his side.

Even in his final days, health rapidly declining, Paddy remained dedicated, bravely striving to bring high-quality magazines such as the next issue of *Western Regional Trenchless Review* to completion. For Paddy, publishing was more than mere work — it was his passion and higher purpose. He took great delight and satisfaction from carefully producing magazines for many of the NASTT Chapters with the highest written and artistic quality possible.

Paddy was forever attentive to the interests of the NASTT community and was a notable proponent and friend of the trenchless technology industry. He worked relentlessly at raising the profile and helping to further the cause of numerous NASTT Chapters. Very simply, Paddy LOVED trenchless! The magazines were his "love made visible."

For those who knew him professionally and personally, Paddy was a great humanitarian with a deep love for the written word. He was a vastly talented writer, gifted musician and remarkably astute businessman. Charming, intelligent and a witty conversationalist, Paddy was always ready with a practical joke or funny play on words.

On behalf of NASTT and all the Regional Chapters, we thank Paddy for his significant contribution to the trenchless technology industry.

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NASTT Regional Chapters

British Columbia

The British Columbia (NASTT-BC) Chapter was established in 2005 by members in the province of British Columbia, Canada.

Chapter Contact

Karl Mueller, Chair
Phone: (604) 293-3293
E-mail: kmuller@kwl.ca



Website

www.nastt-bc.org

Elected Officers

Chair - Karl Mueller
Vice Chair - Rod Loewen
Secretary - vacant
Treasurer - Gurjit Sangha

Great Lakes, St. Lawrence & Atlantic

The Great Lakes, St. Lawrence & Atlantic (GLSLA) Chapter was established in 1995 and represents the Eastern Canadian perspective of the trenchless technology marketplace. GLSLA members are from Ontario, Quebec and the four Atlantic provinces.

Chapter Contact

Isabel Tardif, Chair
Phone: (514) 848-9885
E-mail: Isabel.tardif@ceriu.qc.ca



Website

www.glsla.ca

Elected Officers

Chair - Isabel Tardif
Vice Chair - Kevin Bainbridge
Treasurer - Derek Potvin
Secretary - Gerald Bauer

Mid Atlantic

The Mid Atlantic (MASTT) Chapter was established in 2004 by members from the states of Delaware, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia and the District of Columbia.

Chapter Contact

Richard Thomasson, Chair
Phone: (703) 842-5621
E-mail: rthomasson@pirnie.com



Website

www.mastt.org

Elected Officers

Chair - Richard Thomasson
Vice Chair - Michael Delzingaro
Secretary - Dennis Walsh
Treasurer - Tom Wyatt

Midwest

The Midwest (MSTT) Chapter was established in 1998 to promote trenchless technology education and development for public benefit in Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio and Wisconsin.

Chapter Contact

Jeff Boschert, Chair
Phone: (314) 229-3789
E-mail: jeffboshert@sbcglobal.net



Website

www.mstt.org

Elected Officers

Chair - Jeff Boschert
Vice Chair - Larry Kiest
Secretary - Randy Fries
Treasurer - Bill Shook

Northwest

The Northwest Chapter (NASTT-NW) was established in 1988 by members in the Canadian provinces of Alberta and British Columbia, Canada, and in Washington state. In 2005, the members in British Columbia established the NASTT-BC Chapter. In 2009, the members in Washington state established the Pacific Northwest Chapter and the Northwest Chapter adjusted the geographic area to include the members in the provinces of Manitoba and Saskatchewan, Canada.

Chapter Contact

Duane Strayer, Chair
Phone: (403) 262-4500
E-mail: strayerd@ae.ca



Website

www.nastt-nw.com

Elected Officers

Chair - Duane Strayer
Vice Chair - Dan Willems
Secretary - vacant
Treasurer - Mark Brand

Pacific Northwest

The Pacific Northwest Chapter was established in 2009 by members in the states of Alaska, Idaho, Oregon and Washington.

Chapter Contact

Erik Waligorski, Chair
Phone: (425) 289-7320
E-mail: ewaligorski@rothhill.com



Elected Officers

Chair - Erik Waligorski
Vice Chair - Chris Price
Secretary - Chris Sivesind
Treasurer - Matt Pease

Rocky Mountain

The Rocky Mountain Chapter was established in 2009 by members in the states of Colorado, Utah and Wyoming.

Chapter Contact

Tracy Lyman, Chair
Phone: (303) 534-1100
E-mail: tlyman@lymanhenn.com

Website

www.rmnnastt.org

Elected Officers

Chair - Tracy Lyman
Vice Chair - Al Paquet
Secretary - Ken Matthews
Treasurer - Aaron Burns

Southeast

The Southeast (SESTT) Chapter was established in 2001 to serve the members of NASTT from Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Puerto Rico.

Chapter Contact

Jerry Trevino, Chair
Phone: (877) 462-6465
E-mail: jerry@mechanicaljobbers.com

Website

www.sestt.org



Elected Officers

Chair - Jerry Trevino
Vice Chair - Ed Paradis
Secretary - Chris Ford
Treasurer - Henry Derr

Western

The Western (WESTT) Chapter was established in 2003 by members from the states of Arizona, California, New Mexico, Nevada and Hawaii.

Chapter Contact

Jennifer Glynn, Chair
Phone: (925) 627-4100
E-mail: jglynn@rmcwater.com

Website

www.westt.org

Elected Officers

Chair - Jennifer Glynn
Vice Chair - vacant
Secretary - Jason Lueke
Treasurer - Matt Wallin



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NASTT Student Chapters



Arizona State University

Tempe, Ariz.

Advisor: Dr. Samuel T. Ariaratnam

E-mail: samuel.ariaratnam@asu.edu



Bowling Green State University

Bowling Green, Ohio

Advisor: Dr. Alan Atalah

E-mail: aatalah@bgnnet.bgsu.edu



Concordia
UNIVERSITY

Concordia University

Montreal

Advisor: Dr. Tarek Zayed

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IUPUI

INDIANA UNIVERSITY
PURDUE UNIVERSITY
INDIANAPOLIS

Indiana University - Purdue University Indianapolis

Indianapolis

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UNIVERSITÉ
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McGill University

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Queen's University

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Arlington, Texas

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Vanderbilt University

Nashville, Tenn.

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Virginia Tech University

Blacksburg, Va.

Advisor: Dr. Sunil Sinha

E-mail: ssinha@vt.edu



University of Alberta

Edmonton, Alberta

Advisor: Dr. Alieza Bayat

E-mail: abayat@ualberta.ca

VICTORIA LEADS THE WAY IN STEEL WATERMAIN REHABILITATION

Bruce Kerr, Underground Utilities Engineering, City of Victoria, British Columbia; Marek Pawlowski, M. J. Pawlowski & Associates, Richmond, British Columbia; George Bontus and Ken Foster, Insituform Technologies Ltd., Edmonton, Alberta

INTRODUCTION

The City of Victoria's water distribution system includes approximately 8.4 km of large-diameter steel watermain, ranging in size from 500 mm (20 in.) to 600 mm (24 in.). These watermains were installed in 1927, 1932 and 1946 and have now reached the end of their lifespan and need to be replaced and/or rehabilitated.

The water distribution system in Victoria is categorized as either unregulated or regulated.

- **Unregulated Pressure Watermains:** These mains supply the water to the pressure reducing valves (PRV) that feed the regulated pressure distribution system. These unregulated pressure mains also provide water to the high altitude areas in the city (Cook and Rockland high-level areas) and to the downtown fire distribution system. The pressure in these mains varies between 70 and 150 psi (dependant on elevation). There are approximately 4.8 km of large diameter (500 and 600 mm) unregulated watermains to be rehabilitated as part of the total project.

- **Regulated Pressure Watermains:** These are the distribution mains, downstream of the unregulated supply mains, and provide the majority of the water for domestic use. The pressure in the regulated mains varies between 60 and 90 psi (dependant on elevation). There are approximately 3.6 km of large diameter (500 mm) regulated watermains to be rehabilitated as part of the total project.

The majority of this rehabilitation work is on the supply side (unregulated mains) of the distribution system. The loss of these mains would mean that the distribution system would also be out of water resulting in a situation where the city would not be able to supply customers with any water – an unacceptable option.

SYSTEM PROBLEMS

The soil conditions in which these watermains have been installed vary throughout the project with some lengths of steelmain being located in corrosive soils. This has impacted the performance watermains where some lengths have experienced a high number of water breaks/leaks in recent years. In September 2001 a main on Hillside Avenue experienced a significant water break/leak that triggered Victoria's Engineering Department to start an in-depth review of the condition of these mains (Figures 1 and 2).

CONSIDERATIONS

During the years of 2002 and 2003, the engineering department compiled a database of the leaks along the lengths of the steelmains and identified a number of issues including:

- The watermains are continuing to corrode and new water breaks/leaks are forming regularly (a repair was completed as recently as Aug. 5, 2008).

- Broken watermains can have an affect on drinking water quality and fire fighting capacity.
- With Victoria's growing population and development, do these mains have adequate capacity?
- What replacement/rehabilitation methods should be considered?



Figure 1. Hillside at Prior, September 2001



Figure 2. Condition of the pipe found. Note the patch to fix the leak.

should first be hired to study the condition of the steel watermains and address these issues.

STEELMANS ANALYSIS

In 2004, Victoria's Engineering Department hired Levelton Engineering Ltd. to analyze the structural integrity of large diameter steel watermains and determine life expectancy for each of the various lengths. The resulting analysis, included in a report titled Steel Watermains Life Expectancy Analysis, was based on an analysis of "coupons" taken from various sections of the steel watermains. A summary of the report indicated that the steel watermains were rapidly approaching the end of their lives and should be replaced/rehabilitated starting as soon as 2007, with the majority 8.4 km of the mains needing to be addressed before 2011. The newest portion of main (1946) was shown to be in good shape with little probability of problems over the next 50 years. The engineering department's computer model of the regulated system indicated that this large diameter steelmain was not required to support the regulated system and the initial decision was to abandon this length of main. After considering how to take the Pandora main out of service to accommodate rehabilitation, it was determined that it could not be done without a significant impact on water supply in the Rockland high-level area and the southeast-

- A high proportion of these watermains are located within arterial roads. How can impacts to residents, businesses and traveling public be minimized?

- Along the routes of these mains, there are a number of mature trees. How can impacts on trees be minimized?

- Due to the length and magnitude of the project, how can the city coordinate and communicate the works to residents, businesses and the traveling public?

Victoria's Engineering Department determined that a consultant

ern corner of the city fed by the Leighton pressure reducing station. Through an investigation of this problem it was determined that by converting a section of regulated main to unregulated pressures, it could provide an alternative supply of water into the Rockland high-level area. The decision was made to keep and convert this main, resulting in the requirement to line this segment of pipe to maintain system integrity. The lining would bring this main up to the same pressure rating as the other unregulated mains.

WATER DISTRIBUTION SYSTEM MODELING

In 2005, Victoria’s Engineering Department completed a computer model of the water distribution system. This model is used to determine the adequacy of these and other system mains for capacity and gives the city the ability to run simulations to determine the optimum pipe sizes needed to meet the current and future system demands. A series of scenarios analyzed indicated that the steelmains identified for lining were adequately sized with one stretch of 600 mm main being oversized for projected service requirements.

NEXT STEPS

Based on Levelton’s condition analysis and the city’s water model, Victoria’s Engineering Department engaged Bullock Baur Associates Ltd. (now GENIVAR) and M. J. Pawlowski & Associates to determine the best strategy for replacement/rehabilitation of the steelmains.

RENOVATION PROGRAM

Review of Options

As the city favors trenchless construction where possible, emphasis was placed on exploring options in this area. Benefits of trenchless technologies versus open cut are as follows:

- A shorter construction period than traditional open-cut excavation;
- Minimal disruption and excavation is used, rather than digging up large sections of road;
- A significant reduction in carbon emissions of greenhouse gases during construction;
- A reduced need to excavate treed boulevards, replace pavement or impact underground utilities; and
- Cost savings.

Select Methodology

In June 2008, the consultant completed the *Steel Watermain Rehabilitation Strategy - Preliminary Design Report for the City of Victoria*. This report lays out the recommended strategies to be considered when tendering the rehabilitation work and guided the engineering department in the development of construction tender documents.

Based on review of the Levelton corrosion study (*Steel Watermains - Life Expectancy Analysis, 2005*) and an earlier study by CH2M Hill, it was clear that although there have been a number of recorded leaks in the steelmains throughout the years, the rate of corrosion and pit penetration rates have been relatively slow to develop over the 80 year history of these pipes. This suggested that the remaining integrity of the steelmains will provide the ability to act as a supporting structure for any future lining of these mains. This assumption is key when selecting the liner technology and design methodology.

The consultant, M. J. Pawlowski & Associates, compared the pros and cons of various lining methods available by using *AWWA M28 - Rehabilitation of Watermains, Second Edition*.

This manual provides guidance to help you decide which rehabilitation method is right for a specific situation.

Liner Characteristics	Non-Structural	Semi-Structural		Fully-Structural
	CLASS I	CLASS II	CLASS III	CLASS IV
Internal Corrosion Barrier	YES	YES	YES	YES
Bridges Holes/Gas at Pipe Operating Pressure	NO	YES	YES	YES
Inherent Ring Stiffness	NO (depends on adhesion)	NO (depends on adhesion)	YES*	YES*
Long-Term Independent Pressure Rating \geq Pipe Operating Pressure	NO	NO	NO	YES
Survives “Burst” Failure of Host Pipe	NO	NO	NO	YES

*Minimum requirement is for liner to be self supporting when pipe is depressurized.

Table 1. Liner characteristics as outlined in *AWWA M28 - Rehabilitation of Watermains*.

As can be seen from Table 1, non-structural systems (Class I) are used primarily to protect the inner surface from corrosion, have no effect on the structural performance, have minimal effect on leakage, and its main purpose is to improve water quality in structurally sound pipes. Semi-structural liners (Class II and III) are interactive with the host pipe requiring them to be semi-structural. It is important to note the relevance of the calculated hole and gap spanning capabilities both current and future. It is also important to note there is a cost savings from using a semi-structural verses the risk and life expectancy compared to a replacement solution. Finally, fully-structural liners (Class IV) are considered “equivalent” to a replacement pipe, where the extent to which the structural capability of the liner is independent of the host pipe.

Based on the consultants’ research and analysis of watermain rehabilitation methods capable of meeting the requirements for this project, the consultant recommended:

- Selection of close-fit liner technology using high-density polyethylene (HDPE) as a semi-structural liner. The type of diameter reduction method (symmetrical or fold & form) will be dictated by the required diameter ratio (DR) of the liner. The DR of the HDPE liner will be established at the time of detailed design and will vary depending on the variation of operating pressures in each watermain segment and the acceptable range of hole and gap spanning requirements. The range of DR will vary between 32.5 and 21.

- HDPE provides the ability to install close-fit liners in desirable lengths that minimize the need for excavation pits compared to other lining methods.

- The use of HDPE as a liner readily accommodates reconstructions of existing and installation of future service connections requirements to 200 mm in diameter.

- The selection of HDPE lining material possesses the intrinsic ability to resist seismic events with minimal damage to the pipeline infrastructure.

Close-fit polyethylene technologies were developed to overcome the limitations of conventional slip-lining in terms of hydraulic performance and to provide the ability to use a thinner walled HDPE liners. The basic principal in all types

of close-fit liners is that the liner pipe diameter is reduced to ease the insertion of the liner into the host pipe. Once in place, the HDPE liner is reverted to achieve a “close-fit” or “tight-fit” to the wall of the host pipe. The method of reversion is typically through air or hydrostatic pressure.

HDPE pipe products for use in association with potable water mains are widely accepted by governing health bodies and as such pose few restrictions or limitations on the installation process. Additional benefits offered by the use of HDPE lining material are the ability to absorb both transient pressures (water hammer) and to withstand seismic events, which is a consideration on the west coast of Canada.

Design

Some open-cut installations of smaller mains were necessary, as improvements were made to the system configuration. In addition, a new pressure reducing station (PRV) was built to strengthen the integrity of the water distribution system, and to serve as a back-up to the PRV station serving the eastern side of the Victoria while it was taken off-line during the lining of the east/west feed.

Arborists

Because of the proximity to city trees along the routes, an arborist assessed the impact on those trees that may have been affected, so that prior pruning can be done ahead of the contractor, if necessary. During construction, the arborist supervised the work of the contractor to ensure that no further impact was placed on the tree canopies and to minimize damage to roots that were exposed during excavation of the access pits.

Tender and Award

Victoria’s engineering staff oversaw the administration component of this project. The civil engineering consultant, GENIVAR, was retained to undertake the project management and daily inspection. Insituform Technologies was hired to undertake the lining project.

Communications

The development of a communication strategy ensured that communications were timely and with sufficient frequency to keep all affected informed of the progress of the project. Staff dedicated to the project liaised with the community throughout the project for continuity. Prior to project initiation, the city held two open houses to alert area residents of the upcoming work, and the overall project. Insituform and the city developed communications protocols to ensure that important information was made available to residents and commuters to minimize project impacts. Insituform and the city also notified each residence and business along the lining project in advance as the lining work progressed.

PROJECT IMPLEMENTATION

The project required a significant amount of coordination between contractors and the city. Since Victoria’s water distribution system is complex, it became apparent early in the project planning that close coordination between the contractor and the city would be paramount. The city personnel had the best knowledge relating to the valves that had to be closed or opened to isolate particular segments, or continue to provide service while work progressed.

Since a portion of the system was being converted from regulated to unregulated or high-pressure, ancillary work was required to maintain continuity in the regulated sys-

tem. Some of this work had to be constructed prior to any lining, and some had to be scheduled as the lining reached critical points. In addition, a pressure relief valve (PRV) station was added to the system, and the operations of two other PRV stations were modified.

CONSTRUCTION STAGING REQUIREMENTS

The first work carried out was exposing the existing steelmain at six locations to confirm the OD of the pipe so that the proper liner and end fittings could be procured. The host pipe ID varied from 516 to 527 mm. Based on previous studies, the wall thickness was taken to be 5/16 in. (7.9 mm), resulting in ID ranging from 500 to 511 mm. The design liner OD was 494 mm, 6 mm less than the smallest determined ID.

Two open cut rerouting components north of Stage 1 had to be completed before any lining work could be undertaken. A short section of the distribution system on The Rise was reconstructed to remove it from the steelmain that would be converted to unregulated pressure, and a new segment of 300 mm line was required on Hillside Avenue to maintain continuity if the regulated pressure system. These components were started in December 2008 and completed in April 2009.

One of the issues that had to be addressed in the project was the uncertainty of the operation of the 500 and 600 mm butterfly valves, which had been installed up to 80 years ago.



Figure 3. Line-stop equipment



Figure 4. Line-stop completion plug

The valves on Hillside were exercised and tested. It was determined that the 600 mm valve at the east end of Stage 1 was reliable but the valves to the west were not. A temporary line-stop (a temporary plug inserted into the live main) was required to allow completion of the new 300 mm main on Hillside, and the overall lining project. A specialist firm was contracted to install the line-stop. Figures 3 and 4 show the line-stopping apparatus. Once this was installed and the 300 mm main completed, lining

of Stage 1 to the Belmont PRV and Stage 2 through to Pandora Avenue was possible.

Cement mortar lining added a high degree of friction making the pulling of the liner more difficult.

One of the critical considerations in maintaining service was the supply of water to the regional hospital complex to the east of the construction project. The system configuration required that the new Belmont PRV had to be in full operation prior to shutting down the steelmain on Pandora which fed the PRV that supplies water to the east side of Victoria where the hospital complex is located. Ancillary work at Pandora and Belmont included new connections from the existing

unregulated pressure system to the newly lined 500 mm steelmain in Stages 1 and 2, including a new 300 mm main.

As with the 600 mm valves on Hillside, those on the 500 mm main along Pandora were suspect, and line-stopping was planned to permit the systems connections and lining work. A double line-stop (two stops approximately 20 m apart) was installed at Pandora and Belmont (south end of Stage 2), and a second double line-stop was planned for Cook Street and Pandora Avenue (west end of Stage 4). In addition, 200 mm valves on the connected unregulated pressure distribution system in the vicinity also leaked, and 200 mm line-stops and a hot-tapped 200 mm connection were required in preparation for lining.

The configuration of the unregulated pressure distribution system along Stage 4 (south of Pandora) presented additional constraints to the lining work in the form of multiple connections to the unregulated pressure distribution system. The city requested that Stage 3 (east of Belmont) be lined first to improve reliability and flow to areas to the south of Stage 4.

LINING PROCESS

InsituFold, a close-fit, modified sliplining process selected for the project, is a system where the cross-section of the circular liner is temporarily modified or reduced to permit insertion into the host pipe. Prior to lining, the host pipe is cleaned to remove any deposits, encrustations, or tuberculation. In this project, the existing steelmain was found to be coal tar enamel coated internally, and cleaning was carried out using a high pressure flusher with a chain flail to remove encrustation at welded pipe joints.

The liner pipe is folded by passing it through a folding machine that produces a “celery” or “heart” shaped cross-section, which is maintained by plastic banding at specified intervals. Figure 5 illustrates the folding machine and Figure 6 shows the folded pipe. The folded liner is inserted into the host pipe through an access pit, with a ramp or “chicken run” sloped at 2:1 to guide the pipe in. A winch pulls the liner through the host pipe to the termination pit.

These processes have the flexibility to either fuse out the entire lining length and fold it prior to insertion or if space or local disruption impact dictates, it can be installed by sequentially fusing, folding and inserting directly into the host pipe. All fusion joints are data logged for quality control purposes.

There are, however, risks inherent in the second option, such as if the plastic bands start snapping due to friction, bends or other causes, as the liner can become harder to pull in as it expands prematurely. Prior to insertion by either means, the liner is lubricated using bentonite slurry.

Once the liner is in place, it is allowed to stabilize, typi-

cally overnight. Bands exposed at the ends are cut, and the liner is cut to the required length and re-rounded using Kevlar-reinforced air bags. Specialty end-restrained LinerGrip fittings (Figure 7) are installed, along with blind flanges to allow the pipe to be pressurized to snap the bands, and then further revert the liner back to round. The DR26 PE4710 liner was pressured up to 1100 kPa during reversion.

The connection piping between lined segments was constructed from two 500-mm DR11 HDPE flanged sections, joined by either butt fusion or electrofusion coupling. The project was planned such that wherever possible, the insertion and retrieval pits contained the 40



Figure 7. LinerGrip fittings

side connections for hydrants, valves, air release valves and system connections. Where the system configuration did not permit this, additional excavations were required, and a 350 mm by 350 mm “window” was cut out of the host pipe prior to lining. This allowed a sidewall butt fusion installation of a branch saddle to be installed. This process was very sensitive to temperature and pressure and, along with all pipe joint fusions, was data logged each time. Since the existing line is typically quite shallow, ranging from 0.3 m to more than 2 m, a special configuration for air release valves was designed where they had to be installed at less than 0.7 m cover. For these installations, a 50 mm electrofusion saddle was installed at the pipe obvert and the standard 100 mm air valve piping at 45-degrees off vertical. At each sidewall fusion on the DR26 pipe, the “window” was replaced with a hole cut out for the fitting. These were held in place using specially fabricated steel bands.

Each lined segment was flushed using a flusher truck, since it would be difficult to firstly secure enough flow and secondly deal with the discharge which ultimately entered environmentally sensitive water bodies. Lined segments, along with the new open cut pipes were all pressure tested and chlorinated prior to being commissioned.

Public safety and minimizing disruption were paramount in this project. A significant effort went into traffic control, with a Traffic Management Plan created for each stage outlining the requirements for fusion sites, installation and coordination with the city’s transportation, transit and fire departments, while considering cyclists, the traveling public and fronting property owners. In addition, an Environmental Management Plan was prepared for the project. Underground Utility Engineering provided liaison between the contractor and city departments.

SUMMARY

This paper provided an overview of the process that Victoria’s Engineering Department went through to renew a major component of the city’s water system including the stages of investigation, development of restoration/rehabilitation criteria, preliminary design options, final design development, tendering and award of this trenchless project and the successful relining of 4.5 km of 500 mm and 600 mm steel water mains using close-fit with high density polyethylene.

To view the complete version of Paper C-3-01, please visit www.nastt.org.

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Contact Info:

Sanjiv Gokhale

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E-mail: s.gokhale@vanderbilt.edu

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Web: www.rmnastt.org/events.html

Al Paquet

Phone: 970-215-9115

E-mail: al.paquet@CH2M.com

November

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Michelle Hill

Phone: 330-467-7588

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Peter Kurz, Tri-State Utilities

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E-mail: PeteK@TriStateUtilities.com

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E-mail: info@eventplan.net

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Web: www.nastt-nw.com

Nadeer Lalji, Conference Planning Chair

E-mail: nlalji@nastt-nw.com

December

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Contact Info:

Monica Perry

E-mail: mwperry@telus.net

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Delta Town & Country Inn — Delta, B.C.

Contact Info:

Monica Perry

E-mail: mwperry@telus.net

2012 January

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Contact Info:

Angela Ghosh

Phone: 330-491-0058

E-mail: aghosh@nastt.org

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E-mail: aghosh@nastt.org

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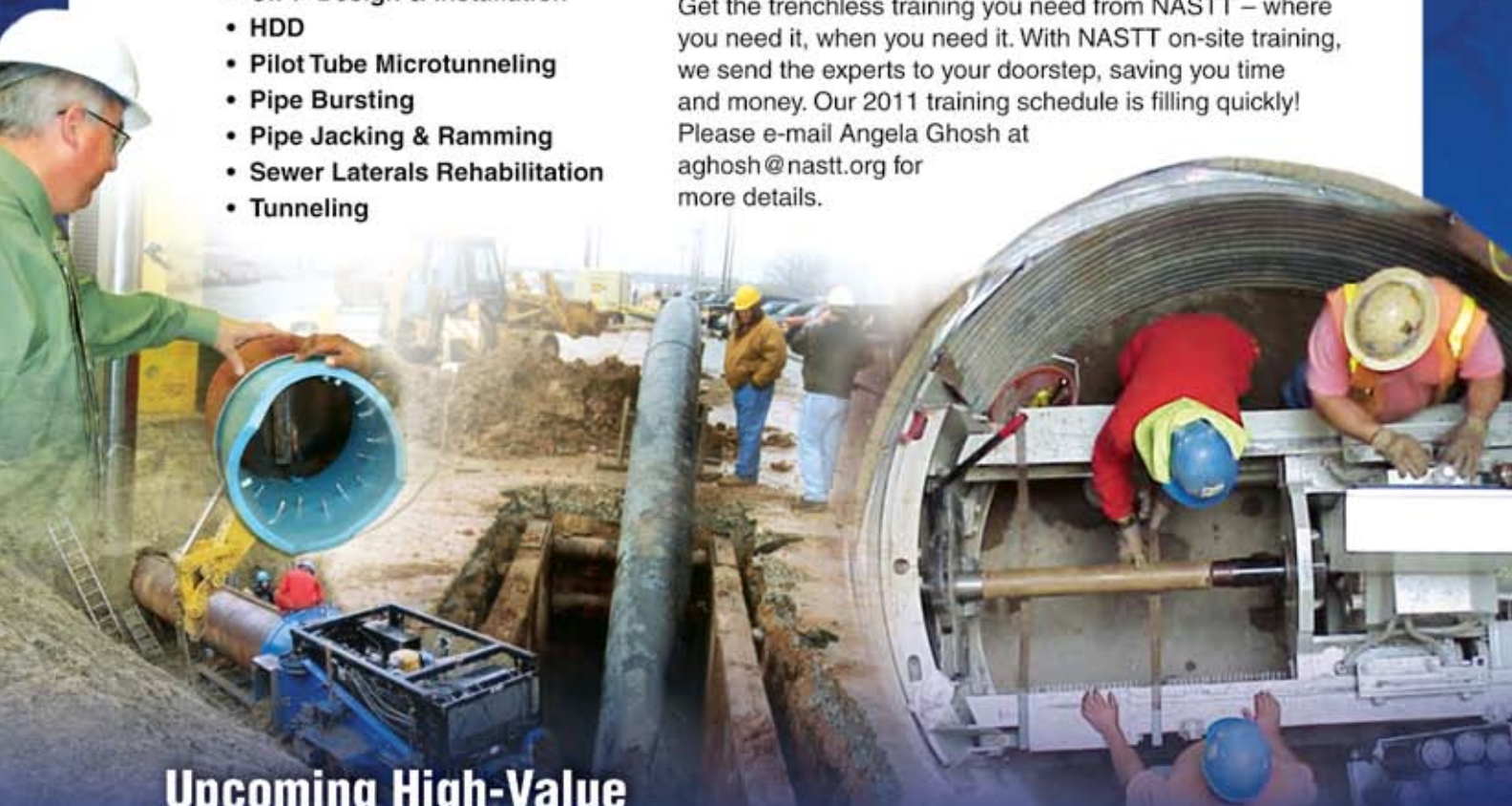
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